BE/ B. Tech (FT) END SEMESTER EXAMINATIONS, DEC 2024

ELECTRICAL AND ELECTRONICS ENGINEERING

EE5602 – POWER ELECTRONICS

(REGULATIONS: 2019)

Time: 3 hours **Max marks: 100**

PART-A (10 x 2 = 20 marks)

(Answer all the questions)

1.	Define snubber circuits.	2
2.	Explain the control strategies of chopper.	2
3.	Define THD and Distortion factor.	2
4.	Write about commutation and it's inverter types?	2
5.	Why single phase bridge converter preferred over Mid-point converter.	2
6.	Define voltage ripple factor and current ripple factor in rectifier circuits.	2
7.	Draw the output voltage waveform of single phase half-wave circuit with RLE load.	2
8.	Write the advantages of freewheeling diode.	2
9.	Write the applications of AC voltage controller.	2
10.	Draw the circuit to obtain variable 1φ AC using TRIAC.	2
	PART –B (5* 13 = 65 marks)	
11. (a)	(i) What is SMPS? Give its industrial applications. (ii) Define latching and holding current in SCR.	(3) (2)
	(iii) The buck regulator has an input voltage of V_s=12 V. The required average output voltage is Va=5V at R=500 Ω and the peak to peak output voltage is 20 mV.The switching frequency is 25 kHz. If the peak to peak ripple current of inductor is limited to 0.8A,determine (a) The duty cycle k,(b) The filter inductance L and(c) The filter capacitor C and (d) The critical values of L and C.	(8)
	(OR)	
11.(b)	(i)Briefly write about the working of isolated fly back converter.	(8)
	(ii)With the neat circuit diagram explain the working of boost converter.	(5)

12. (a)	Discuss the function of three phase VSI in 120° mode of operation with neat circuit diagram and the load is star connected resistor.	(13)
	(OR)	
12 .(b)	(i) Differentiate VSI and CSI?	(5)
	(ii) Briefly explain the voltage control in single phase inverters.	(8)
13. (a)	A three phase bridge rectifier using diodes, delivers power to a load of R=10 Ω at a DC voltage of 400 V.Determine the rating of the diode and of the three phase delta -star transformer.	(10)
	(ii)What is the need of filter circuits.	(3)
	(OR)	
13. (b)	(i) Write the types of three phase rectifier and its applications.	(5)
	(ii) A single phase two pulse diode rectifier has input supply voltage of 230 V, 50 Hz ,and a load resistance of R=20Ω and load inductance=10mH.An LC filter is to be used on output side to reduce the output voltage ripple to 15%. Design the LC filter.	(8)
14. (a)	A three phase full converter delivers a ripple free load current of 10A with a firing angle delay of 45°,The input voltage is 3 phase, 400 V, 50 HZ. (i) Express the source current in Fourier series. (ii) Find the DF, CDF, THD and PF. (iii) Calculate the active and reactive powers. Also draw output wave form of three phase full converter.	(13)
	(OR)	
14. (b)	(i)Discuss the effect of source inductance on the performance of single phase full converter and derive the expressions.	(8)
	(ii) Explain two transistor analogy and derive expressions for current.	(5)
15. (a)	(i) A single phase full wave AC voltage controller has a load of R=6Ω and input voltage is 230V, 50HZ of load power is 4 KW . Find the firing angle delay of thyristors and input power factor.	(7)
	(ii) Explain 2 stage sequence control of AC voltage controller with RL load and its waveform.	(6)
	(OR)	
15. (b)	Briefly explain the operation of three phase AC voltage controller and also draw the wave form for α =60 ° and α =120°.	(13)
	PART – C (15 marks)	
16.	(a)(i) A boost regulator has an input voltage of Vs = 5v, the average output voltage Va= 15 V and the average load current Ia=0.5 A. The switching frequency is 25 kHz. If L=150μH and C = 220 μF. Determine (i) The duty cycle (ii) The ripple current of inductor ΔI (iii) The peak current of inductor I_2 (iv) The ripple voltage of filter capacitor ΔV (v) The critical value of L and C.	(10)
	(ii) Design a voltage doubler circuit with neat circuit diagram.	(5)